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Asplenium × *kentuckiense* on Granitic Gneiss in Georgia

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The rare Kentucky Spleenwort has recently been found in Stephens County, Georgia, far south of the nearest previously known station in Floyd County, Kentucky. The fern appears to grow in a habitat not previously reported for the species. Mr. G. W. McDowell, of Asheville, North Carolina, and Mr. F. D. Snyder, of Toccoa, Georgia, visited the new locality on 19 April 1964, and found *Asplenium pinnatifidum* there in crevices of ledges and boulders bordering a relatively smooth, sloping expanse of granitic gneiss. McDowell (1965) reported the find, pointing out that *A. platyneuron* also occurred at the site and that some of the plants possibly were hybrids. I was unable to visit the station until Mr. Snyder took me there on 31 December 1965. Unfortunately our stay was limited, but I was able to collect a representative specimen of *A. pinnatifidum* for the University of Georgia Herbarium. In addition, the largest leaf was taken from each of several other aspleniums that exhibited interesting variations compared to the collected plant. *Asplenium platyneuron* was observed in the crevices of the ledges and boulders, as well as in soil in the vicinity.

At the University of Georgia the individual leaves were examined for evidence of hybridity, but lacking herbarium specimens for comparison, I set them aside for the expected visit of Dr. W. H. Wagner, Jr., in March 1966. One of the leaves was identified by Dr. Wagner as *A. × kentuckiense*. We therefore arranged to visit the collection site on 26 March. On this visit we were unable to locate the plant of *A. × kentuckiense* from which I had collected the leaf. This plant had been seen in the crevice

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of a south-facing ledge. I did locate another specimen of this fern on a partially-shaded east-facing ledge in a crevice which was oriented up and down the slope. This specimen was collected by Dr. Wagner for culture, study, and experiments at the University of Michigan. A graduate student (Bobby Lane) and I, together with our wives, returned to the habitat on 2 April and spent considerable time in an unsuccessful search for more specimens of the Kentucky Spleenwort. A few dead plants of *Asplenium* were seen in the crevices of the south-facing ledges. One of these may have been the first of the two plants of the Kentucky Spleenwort that were located, the plant having died during the dry and severely cold weather that occurred between 31 December and the late March and early April visits to the locality. Very small plants which were also seen in the crevices may prove to be the Kentucky Spleenwort when they become larger, but at present their identity is not certain.

Wagner (1954), Smith et al. (1961), and Smith and Levin (1963) have presented data indicating that *A. × kentuckiense* is a hybrid between *A. pinnatifidum* and *A. platyneuron*. Since both of these species occur in adjacent crevices of the ledges and boulders of the Stephens County station, an excellent opportunity exists for hybridization between them. The identity of the specimens of *A. × kentuckiense* thus is supported by the presence of the two parents. In addition the abortive spores of the two plants are indicative of the $3x$ condition of hybrids between the tetraploid *A. pinnatifidum* and the diploid *A. platyneuron*. *A. × kentuckiense*, therefore, remains known by sterile plants only. There seems to be no parallel yet known in Appalachian spleenworts to the hybrid species *A. × ebenoides*, which has both sterile and fertile elements.

The habitat where the specimens of the Kentucky Spleenwort were found is unusual in that it combines the conditions necessary for both parents. At other localities *A. pinnatifidum* more frequently occurs on shaded cliffs where *A. platyneuron* is absent or rare. At the new locality most ledges and boulders are only partially shaded by vegetation on the surrounding relatively

shallow slopes. *Asplenium platyneuron* also seems better adapted to other habitats, being more abundant in thickets, fence rows, rich upland woods, and moist wooded ravines not far away. The conditions where the plants of *A. × kentuckiense* were found seem to be somewhat marginal for the two parents. However, their ability to grow under the same combination of conditions favored the formation of the two hybrid plants.

The general nature of the habitat where the *A. × kentuckiense* plants were found may be seen in *Fig. 1*. The southern exposure of the ledge is evident, as are deciduous trees, which will provide more shade after their leaves appear. The second plant of *A. × kentuckiense* was found on the east face of this same ledge about 30 feet up the slope from the right margin of the photograph. This locality is, of course, protected from the afternoon sun and is partially shaded by trees earlier in the day.

Growing in the crevices of the ledges and boulders of the area in addition to the three aspleniums are plants of *Cheilanthes tomentosa*, *Campanula flexuosa*, *Carex* sp., and *Panicum* sp., plus small plants of *Smilax glauca*, *Vaccinium arboreum*, *Quercus montana*, *Pinus virginiana*, and *Kalmia latifolia*.

The habitat of the adjacent slopes is relatively dry. The forest is not dense and is composed of species characteristic of poor sites. The most abundant species are *Pinus virginiana*, *P. taeda*, *Quercus marilandica*, *Q. montana*, *Q. falcata*, *Carya pallida*, *Nyssa sylvatica*, *Diospyros virginiana*, and *Oxydendrum arboreum*. The understory near the ledges includes scattered individuals of *Vaccinium arboreum*, *Prunus americana*, *Viburnum rufidulum*, *Amelanchier canadensis*, *Rhododendron canescens*, *Asimina parviflora*, *Callicarpa americana*, *Vitis rotundifolia*, *Vaccinium vacillans*, *Bignonia capreolata*, *Rhus toxicodendron*, *Chimaphila maculata*, *Pteridium aquilinum*, *Chrysopsis* sp., and *Viola pedata*.

The granitic gneiss rocks upon which the *A. × kentuckiense* plants were found apparently represent a new type for the taxon. Rocks at previously reported stations, when specified, have all been sandstone. In the original description for the taxon, based

on specimens from Kentucky, McCoy (1936) reports the habitat as "Found on sandstone cliffs . . .". Wagner (1958) summarizes data concerning the habitats of the fern from other localities. Collections from sandstone rocks are listed from Pike County, Ohio, and Benton County, Arkansas. He also points out a collection two miles west of Chatham, on a boulder in open woods,

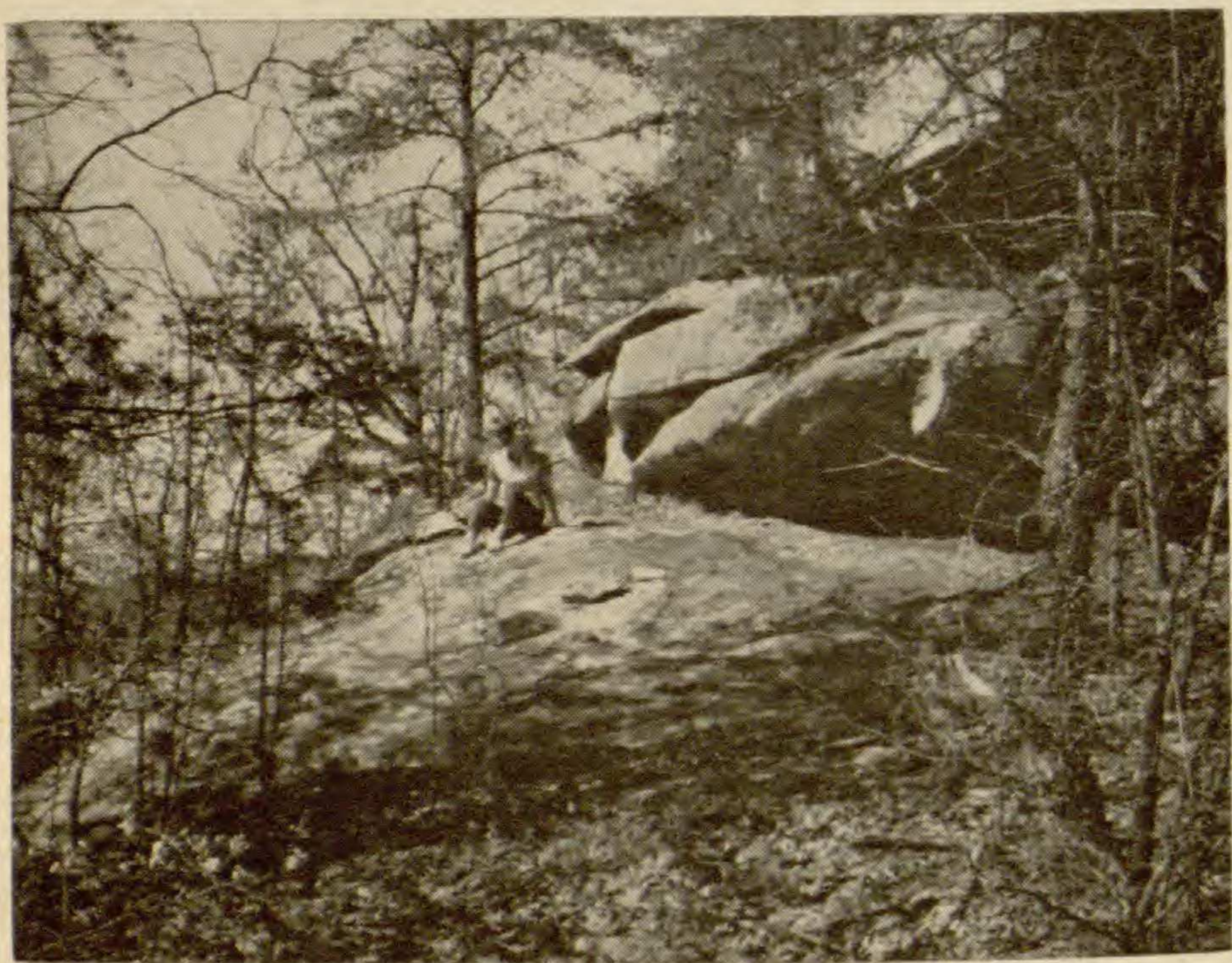


FIG. 1. GRANITIC GNEISS LEDGE IN STEPHENS COUNTY, GEORGIA, SHOWING CREVICES IN WHICH *A. PINNATIFIDUM* AND *A. PLATYNEURON* OCCUR. *A. X KENTUCKIENSE* WAS FOUND IN SIMILAR CREVICES NEARBY.

Pittsylvania County, Virginia. According to a recent geologic map of Virginia (Calver, 1963), this locality is in an area of metamorphosed sedimentary and interlayered igneous rocks, predominantly mica schists. Residual boulders in such an area are very likely quartzites and related to, if not similar to, the sandstone rocks indicated earlier. Smith et al. (1961) describe an additional collection from a sandstone outcrop in Floyd County,

Kentucky. It appears, therefore, that *A. × kentuckiense* usually occurs on sandstone or perhaps other types of quartzite rocks. It is now known to occur on granitic gneiss in Georgia.

Asplenium pinnatifidum is known from eight other counties in Georgia. Sandstone rocks are involved in the habitat of this fern in three of these: Walker and Dade Counties in northwestern Georgia and Twiggs County in the inner margin of the Coastal Plain in central Georgia. The other five counties are in the Piedmont where the rocks are granitic. Since *A. platyneuron* is abundant in these areas it is possible that *A. × kentuckiense* occurs on granite rocks at one or more other localities of the Piedmont.

The leaf specimen of *A. × kentuckiense* from Stephens County, Georgia, is deposited in the University of Georgia Herbarium and bears the following data: Crevice of south-facing granitic gneiss ledge about 2 miles NNE of Toccoa. Elevation about 1100 feet. Margin of Blue Ridge and Piedmont Provinces. *Wilbur H. Duncan 22575* and Frank Snyder. 31 December 1965.

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